

ADVANCED CONCEPTS AND PRACTICES FOR INVESTING PUBLIC FUNDS

Cash Flow Management & Forecasting

The California Debt Investment Advisory Commission
October 22, 2009

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Cash Flow Management – Not Just Paying Bills?

1. What is good “cash flow” management?
2. What is the purpose of the investment portfolio?
3. What is our investment strategy?
4. What role does “cash flow” management play in managing a public fund portfolio?
5. What are some analytical techniques for integrating cash management and portfolio management?

What Is Good “Cash Flow” Management?

1. Does not rely on intuition but has developed metrics that provide for informed decision making
2. Insures principal preservation is #1 priority
3. Obligations are paid on time without the need to liquidate securities
4. Portfolio is constructed to earn the optimum income during the current budget cycle

What Is Purpose Of Investment Portfolio?

1. Addresses why Yield is policy objective
2. To earn optimal income which can be reinvested in the community to:
 - a. Increase public services
 - b. Help defray operating cost
 - a. Help mitigate tax burden on citizens

What Is Our Investment Strategy?

1. Choices:
 - a. Income or Growth
 - b. Investor or Trader
2. City of San Jose uses a income focused market rate of return or book yield investment strategy.
3. In implementing strategy price change or unrealized gains or losses are not considered.

What Role Does Cash Management Play?

1. Cash management is the foundation on which portfolio is constructed.
2. Cash management integrates past, present and future into the investment decision process
3. Cash management is a critical process for optimizing portfolio income.

Analytical Techniques For Reducing Uncertainty

1. Liquidity estimating
2. Using short term sensitivity analysis to insure tactical liquidity remains optimally invested
3. Concepts and Analysis
 - Politics of Forecasting
 - Why MRR (book yield) optimizes portfolio earnings within a budget cycle

Liquidity Estimating Concepts

1. A metric for quantifying the policy directive to place safety and liquidity before income.
2. Crucial in transitioning from intuition to informed decision making
3. Portfolio consist of two virtual portfolio's; liquidity (strategic) and income (tactical)
4. Minimizes opportunity cost when implemented

Liquidity Estimating Concepts Cont'd

5. Total Portfolio = Strategic + Tactical + Bonds
6. Strategic Liquidity = Primary + Secondary
 - Primary = Operating + Cushion
 - Secondary = Additional Cushion
7. Total Liquidity = Strategic + Tactical (idle)
8. Tactical = Investable Funds
9. Tactical = Total Liquidity – Strategic Liquidity

Liquidity Estimator

1. Gather historical monthly cash flows (36 mo)
2. Using various scenarios define appropriate “liquidity multiple”
3. Scenarios consist of short term and long term evaluation periods (12 and 36mo)
4. Compare results and adjust existing liquidity

County of Sample

Historical Monthly Cash Balances

Month	Float	Receipts	Expenditures	Net Flow
June-04	\$0	\$5,159,307	\$5,877,377	(\$718,070)
July-04	\$0	\$5,672,942	\$6,106,205	(\$433,263)
August-04	\$0	\$7,242,181	\$5,756,508	\$1,485,673
September-04	\$0	\$26,111,958	\$19,412,340	\$6,699,619
October-04	\$0	\$39,803,320	\$42,068,780	(\$2,265,460)
November-04	\$0	\$18,227,196	\$23,786,028	(\$5,558,832)
December-04	\$0	\$7,610,784	\$6,933,783	\$677,002
January-05	\$0	\$5,626,844	\$6,949,321	(\$1,322,477)
February-05	\$0	\$12,960,968	\$7,911,953	\$5,049,014
March-05	\$0	\$19,663,403	\$22,939,808	(\$3,276,405)
April-05	\$0	\$15,862,641	\$17,811,918	(\$1,949,277)
May-05	\$0	\$10,250,646	\$10,207,404	\$43,241
June-05	\$0	\$5,500,689	\$5,054,592	\$446,097
July-05	\$0	\$7,543,910	\$7,464,618	\$79,291
August-05	\$0	\$7,099,493	\$5,435,112	\$1,664,381
September-05	\$0	\$24,819,404	\$20,068,090	\$4,751,314
October-05	\$0	\$34,699,451	\$39,678,991	(\$4,979,539)
November-05	\$0	\$23,523,042	\$23,290,345	\$232,697
December-05	\$0	\$7,232,585	\$9,021,189	(\$1,788,603)
January-06	\$0	\$9,490,143	\$8,173,904	\$1,316,239
February-06	\$0	\$11,233,562	\$10,761,922	\$471,640
March-06	\$0	\$22,012,829	\$22,057,635	(\$44,806)
April-06	\$0	\$22,060,778	\$19,318,289	\$2,742,489
May-06	\$0	\$6,594,153	\$8,766,332	(\$2,172,179)
June-06	\$0	\$12,820,717	\$15,446,766	(\$2,626,048)
July-06	\$0	\$13,245,874	\$9,912,312	\$3,333,562
August-06	\$0	\$11,262,793	\$5,953,537	\$5,309,255
September-06	\$0	\$33,587,872	\$13,099,895	\$20,487,977
October-06	\$0	\$56,276,860	\$46,159,510	\$10,117,350
November-06	\$0	\$6,894,479	\$27,880,934	(\$20,986,455)
December-06	\$0	\$8,375,699	\$12,757,097	(\$4,381,399)
January-07	\$0	\$12,939,580	\$13,805,944	(\$866,364)
February-07	\$0	\$19,587,132	\$21,193,054	(\$1,605,921)
March-07	\$0	\$42,496,896	\$29,516,508	\$12,980,389
April-07	\$0	\$15,374,985	\$29,241,551	(\$13,866,567)
May-07	\$0	\$20,582,726	\$22,671,457	(\$2,088,731)
June-07	\$0	\$9,286,025	\$14,375,821	(\$5,089,796)



User Inputs

Multiplier

<u>Primary Liquidity</u>	3
<u>Secondary Liquidity</u>	1
<u>Total Liquidity</u>	4.0

	Current	%
<u>Portfolio Balance</u>	\$325,000,000	100%
<u>Primary Liquidity</u>	\$160,000,000	49.2%
<u>Secondary Liquidity</u>	\$120,000,000	36.9%
<u>Total Liquidity</u>	\$280,000,000	86.2%

Scenario #3 – Historical 36mo Normal

Normal Cash Flow - Lowest Month		<i>Month of Occurrence</i>
Float	\$0	November-06
Receipt	\$6,894,479	
Expenditure	\$27,880,934	
Lowest Net Cash Flow	(\$20,986,455)	<i>Multiplier</i>
Primary Liquidity Coverage	\$62,959,365	3x
Secondary Liquidity Coverage	\$20,986,455	1x
Total Liquidity Coverage	\$83,945,820	4x
Actual Liquidity - Primary	\$160,000,000	7.6x
Actual Liquidity - Secondary	\$120,000,000	5.7x
Total Liquidity	\$280,000,000	13.3x

County of Sample

Liquidity Allocation

Plan Created October-09

Current Liquidity Allocation

Primary Liquidity Multiplier	7.6
Secondary Liquidity Multiplier	5.7
Total Liquidity Multiplier	13.3

	Current	%
Portfolio Balance	\$325,000,000	100%
Primary Liquidity Balance	\$160,000,000	49.2%
Secondary Liquidity Balance	\$120,000,000	36.9%
Total Liquidity	\$280,000,000	86.2%

36-Month History

<i>Normal Cash Flow - Lowest Month</i>		<i>Month of Occurrence</i>
Maximum Float	\$0	November-06
Minimum Receipt	\$6,894,479	
Maximum Expenditure	\$27,880,934	
Lowest Net Cash Flow	(\$20,986,455)	
		<i>Multiplier</i>
Actual Liquidity - Primary	\$160,000,000	7.6x
Actual Liquidity - Secondary	\$120,000,000	5.7x
Total Liquidity	\$280,000,000	13.3x

Investment Plan Liquidity Allocation

Primary Liquidity Multiplier	2.9
Secondary Liquidity Multiplier	0.9
Total Liquidity Multiplier	3.9

	New Allocation	%
Portfolio Balance	\$325,000,000	100%
Primary Liquidity Balance	\$61,750,000	19.0%
Secondary Liquidity Balance	\$19,500,000	6.0%
Total Liquidity	\$81,250,000	25.0%

36-Month History Using Plan Allocation

<i>Normal Cash Flow - Lowest Month</i>		<i>Month of Occurrence</i>
Maximum Float	\$0	November-06
Minimum Receipt	\$6,894,479	
Maximum Expenditure	\$27,880,934	
Lowest Net Cash Flow	(\$20,986,455)	
		<i>Multiplier</i>
Planned Liquidity - Primary	\$61,750,000	2.9x
Planned Liquidity - Secondary	\$19,500,000	0.9x
Planned Total Liquidity	\$81,250,000	3.9x

Identifying Tactical Liquidity

	Current Liquidity	Investment Plan	Variance	% Chg
Primary	\$160,000,000	\$ 61,750,000	\$ 98,250,000	61.41%
Secondary	\$120,000,000	\$ 19,500,000	\$ 100,500,000	83.75%
Total	\$280,000,000 Total Liquidity	\$ 81,250,000 Strategic	\$198,750,000 Tactical	70.98%

Cash Flow Forecast – Sensitivity Analysis

- Rate sensitivity analysis is an important due diligence process for portfolio management
- Monitors market conditions that can adversely effect investment decisions and strategy
 - Liquidity estimation creates a plan for how much tactical liquidity is available for investment
 - Evaluates strategic and tactical liquidity in light of various interest rate outcomes

INVESTMENT PORTFOLIO/PLAN STATUS REPORT

Prepared for: *Sample*

Prepared by: *Cantor Fitzgerald*

LIQUIDITY	PORTFOLIO	PLAN	VARIANCE
Primary	42.62	11.00	31.62
Secondary	1.49	6.00	(4.51)
TOTAL	44.11	17.00	27.11

Portfolio Par Value(\$000):	\$683,826
Portfolio Market Value(\$000):	\$689,496
Portfolio Book Value(\$000):	\$683,698
Gain/Loss (\$000):	\$3,768

FUNDAMENTALS	PORTFOLIO	PLAN	VARIANCE
AVG COUPON	1.52	2.69	(1.17)
AVG MATURITY	1.28	1.67	(0.39)
AVG QUALITY	Aaa	Aaa	
PUR YIELD/MktRtn	1.54	1.30	0.24
EFF DURATION	0.68	1.07	(0.39)
CONVEXITY	(0.19)	(0.15)	(0.04)

*Pur Yield is Wgtd Avg Yld using original cost & purchase date

*MktRtn is the Market Rate of Return(12 Month Avg of 15Mo CMT)

DURATION	PORTFOLIO	PLAN	VARIANCE
CASH	42.62	11.04	31.58
0 - 1 YRS	17.62	29.34	(11.72)
1 - 2 YRS	38.23	48.93	(10.70)
2 - 3 YRS	1.54	10.38	(8.84)
3 - 4 YRS	0.00	0.00	0.00
4 - 5 YRS	0.00	0.00	0.00
5 - 6 YRS	0.00	0.00	0.00
6 - 7 YRS	0.00	0.00	0.00
7 - 8 YRS	0.00	0.00	0.00
8 - 9 YRS	0.00	0.00	0.00
9 - 10 YRS	0.00	0.00	0.00
10 + YRS	0.00	0.00	0.00

SECTOR	PORTFOLIO	PLAN	VARIANCE
Cash/MM	42.61	11.00	31.61
US Treasury	0.00	6.00	(6.00)
US Agency	57.39	83.00	(25.61)
US Agency Bullets	12.12	34.00	(21.88)
US Agency Callables	33.63	49.00	(15.37)
US Agency Structure	11.64	0.00	11.64
US Pass-Thru	0.00	0.00	0.00
US ABS	0.00	0.00	0.00
US Corporates	0.00	0.00	0.00
US Corp Industrial	0.00	0.00	0.00
US Corp Finance	0.00	0.00	0.00
Other Corp	0.00	0.00	0.00
OTHER	0.00	0.00	0.00

MATURITY	PORTFOLIO	PLAN	VARIANCE
CASH	42.62	11.00	31.62
0 - 1 YRS	1.49	6.00	(4.51)
1 - 2 YRS	22.21	48.51	(26.30)
2 - 3 YRS	33.69	34.27	(0.58)
3 - 4 YRS	0.00	0.21	(0.21)
4 - 5 YRS	0.00	0.00	0.00
5 - 7 YRS	0.00	0.00	0.00
7 - 10 YRS	0.00	0.00	0.00
10 - 15 YRS	0.00	0.00	0.00
15 - 20 YRS	0.00	0.00	0.00
20 - 25 YRS	0.00	0.00	0.00
25+ YRS	0.00	0.00	0.00

PORTFOLIO SENSITIVITY ANALYSIS			
Instantaneous	-25bp	Unchanged	+100bp
Effective Duration	0.64	0.68	0.91
Convexity	(0.14)	(0.19)	(0.25)
3 Month Horizon	-25bp	Unchanged	+100bp
Effective Duration	0.52	0.56	0.80
Convexity	(0.12)	(0.15)	(0.31)
Forecasted Pyld	1.06	1.20	1.82
\$ Called/Matured	100,000	100,000	40,000
12 Month Horizon	-25bp	Unchanged	+100bp
Effective Duration	0.15	0.15	0.39
Convexity	0.00	0.00	(0.17)
Forecasted Pyld	0.53	0.76	1.75
\$ Called/Matured	320,000	320,000	180,000

LIQUIDITY	PORTFOLIO	PLAN	VARIANCE
Primary	42.62	11.00	31.62
Secondary	1.49	6.00	(4.51)
TOTAL	44.11	17.00	27.11

Portfolio Par Value(\$000):	\$683,826
Portfolio Market Value(\$000):	\$689,496
Portfolio Book Value(\$000):	\$683,698
Gain/Loss (\$000):	\$3,768

PORTFOLIO SENSITIVITY ANALYSIS

Instantaneous	-25bp	Unchanged	+100bp
Effective Duration	0.64	0.68	0.91
Convexity	(0.14)	(0.19)	(0.25)
3 Month Horizon	-25bp	Unchanged	+100bp
Effective Duration	0.52	0.56	0.80
Convexity	(0.12)	(0.15)	(0.31)
Forecasted Pyld	1.06	1.20	1.82
\$ Called/Matured	100,000	100,000	40,000
12 Month Horizon	-25bp	Unchanged	+100bp
Effective Duration	0.15	0.15	0.39
Convexity	0.00	0.00	(0.17)
Forecasted Pyld	0.53	0.76	1.75
\$ Called/Matured	320,000	320,000	180,000

Politics of Budget Forecasting

Budget Strategy – How Much To Forecast

- Questions needing answers
 - Is the amount a forecast or obligation
 - Are unrealized gains / losses included in budget
 - Are you indifferent to source of return
 - Are you a investor or trader
 - What is the portfolio income haircut
 - What duration optimizes forecast/budget
- What's the methodology
 - GASB 31 – 3mo T-bill
 - Market Rate of Return – 12 mo moving average
 - Annualized Total Return

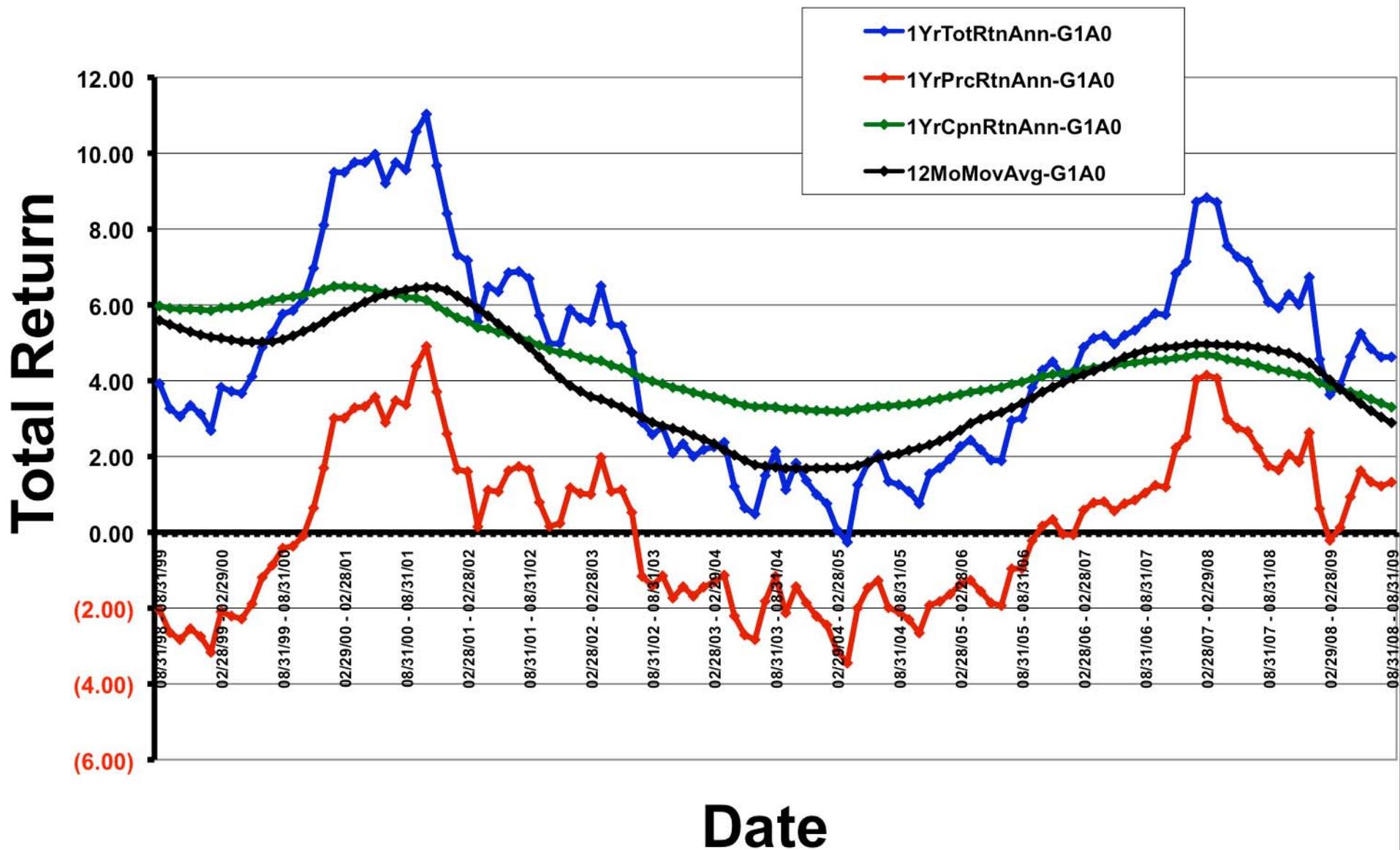
Income vs Price – Stability vs Volatility

MERRILL LYNCH INDICES				
Rates of Return				
From:	8/31/99	To:	8/31/09	Inception Date
				Total Return: 9/30/82
Currency	LDC	Percent Hedged		Price Return: 9/30/82
G1AC Unsubordinated U.S. Treasuries/Agencies, 1-3 Yrs				
	Total Return Index		Price Return Index	
	8/31/99	8/31/09	8/31/99	8/31/09
Index Value	384.733	609.125	99.911	102.878
Periodic Return		58.324		2.970
Annualized Return		4.698		0.293

Coupon = 4.41 / **93.8%**

Price = .29 / **6.2%**

Total Return Component Analysis: 1Yr Annualized Returns



Spending Analysis

Analysis Results

05/31/84 to 08/31/09

Number of Observations = 292

How Often Principal Invaded = 103 / 35%

08/31/99 to 08/31/09

Number of Observations = 120

How Often Principal Invaded = 51 / 40%

- 12mo moving average of ML 1-3 Govt used to proxy book yield and monthly spending requirement for budget period
- Monthly Total Return on ML1-3 is year is used to proxy monthly portfolio earnings to service spending requirement

Which Yields Best Results

Index Analysis Toolkit 06/30/01 to 08/31/09		
Portfolio Size (\$000):	100,000,000	
Indices for Portfolio Composition:	Gasb 31	Market Rate of Return
G0O1: 3Mo Tbill	100.0%	30.0%
G1O2: Tsy 1-3Yr	0.0%	0.0%
G1PB: Agy Blt 1-3Yr	0.0%	0.0%
G2PB: Agy Blt 3-5Yr	0.0%	0.0%
GVPB: Agy Blt 1-5Yr	0.0%	30.0%
G1PC: Agy Clbl 1-3Yr	0.0%	0.0%
G2PC: Agy Clbl 3-5Yr	0.0%	0.0%
GVPC: Agy Clbl 1-5Yr	0.0%	40.0%
CV10: Corp A-AAA 1-5 Yrs	0.0%	0.0%
CMOV: CMO Agency 1-5Yr	0.0%	0.0%
M1A0: Mtge 0-3Yr WAL	0.0%	0.0%
MVA0: Mtge 0-5Yr WAL	0.0%	0.0%
Total Allocation:	100.0%	100.0%

Reinvestment Risk or Interest Rate Risk

	Gasb 31	Market Rate of Return
	Book Yield (Income) / Total Return Analysis	
Average Portfolio Income:	2.630 Avg Pyld \$2,629,593 Avg Income	3.562 Avg Pyld \$3,561,770 Avg Income
Standard Deviation of Income:	149.023bp StdDev \$1,490,227 StdDev of Income	110.831bp StdDev \$1,108,309 StdDev of Income
Horizon Total Return (6/30/01-08/31/09):	2.571 Total Return (Annualized)	3.804 Total Return (Annualized)
Minimum Portfolio Income:	0.224 Min Pyld \$224,000 Min Income	1.861 Min Pyld \$1,861,058 Min Income
Maximum Portfolio Income:	5.215 Max Pyld \$5,215,000 Max Income	5.773 Max Pyld \$5,772,917 Max Income

Forecaster or Investor

	Gasb 31	Market Rate of Return
	Interest Rate Risk (GASB 31) Analysis	
Average Portfolio Effective Duration:	0.239 Avg Edur If Interest Rates Rise(Fall) by 100bp then the Portfolio Market Value would Decrease(Increase) by \$238,535	1.377 Avg Edur If Interest Rates Rise(Fall) by 100bp then the Portfolio Market Value would Decrease(Increase) by \$1,377,177
Standard Deviation of Duration:	0.74bp StdDev of Edur	16.96bp StdDev of Edur
Minimum Portfolio Duration:	0.221 Min Edur	1.009 Min Edur
Maximum Portfolio Duration:	0.251 Max Edur	1.763 Max Edur

Opportunity Cost

POLICY ENHANCED ASSETS TABLE			
	Scenario #1	Scenario #2	Scenario #3
Current Portfolio Par:	\$100,000,000	\$100,000,000	\$100,000,000
Current Purchase Yield:	2.63%	3.09%	3.38%
Proposed Yield Pickup(bp):	93.22	40.00	44.00
Proposed New Purchase Yield:	3.56%	3.49%	3.82%
Additional Income Produced:	\$932,177	\$400,000	\$440,000
Portfolio Additional \$ Needed to Produce Proposed Income:	\$35,449,467	\$12,944,984	\$13,017,751
		5Yr History	10Yr History
	GASB vs MRR	3mo-2yr Spread	3mo-2Yr Spread
Enhanced Basis Points	93.22	36.00	49.00
Enhanced Cash Flow	\$932,177	\$360,000	\$490,000

Session Take Away's

1. Know the purpose of your investment portfolio
 - Income: reinvest back into community
 - Growth: grow the portfolio
1. Public funds are not indifferent to the source of return when budgeting
 - In practice unrealized gains/losses excluded from budget
 - MRR (book yield) is more predictable / stable
 - Income stability minimizes haircuts to budget

Session Take Away's

3. Budget Politics

- A forecast is an obligation – fear of midyear adjustment
- GASB31 focus on avoiding paper losses actually creates opportunity losses even greater

3. Duration is key to optimizing budget

- Cash creates significant forecasting risk
- Duration = budget cycle
- Trade-off between reinvestment risk and GASB 31

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